PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-291530
(43)Date of publication of application : 18.10.1994

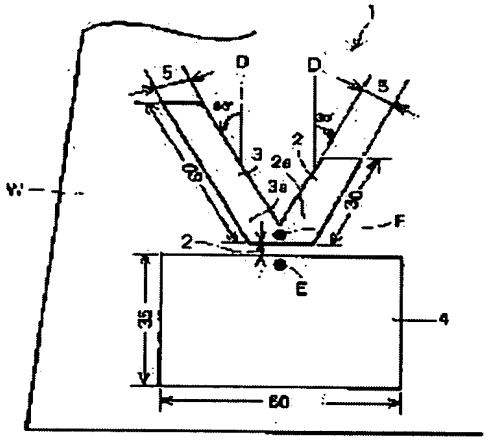
(51)Int.Cl. H01Q 1/32
H01Q 1/48
H01Q 21/30

(21)Application number : 05-077163
(22)Date of filing : 02.04.1993

(71)Applicant : NIPPON SHEET GLASS CO LTD
(72)Inventor : MURAKAMI HARUNORI
IIJIMA HIROSHI
DOI RYOKICHI

(54) FREQUENCY SWITCHING TYPE GLASS ANTENNA

(57)Abstract:
PURPOSE: To provide the frequency switching type glass antenna which can be provided in a space being in common with a monopole antenna, and also, dispenses with a switching member.
CONSTITUTION: The glass antenna 1 is formed by coupling each one end of a first radiation pattern 2 and a second radiation pattern 3 of each different length and providing them in a V-shape against the vertical direction of the glass surface W, and providing a ground pattern 4 in the lower part of this V-shape pattern. Also, to the lower end part F of the V-shape pattern, a core wire of a feeding coaxial cable is connected, and to the center part E of the upper end of the ground pattern 4, a braided wire of the cable is connected, and the other end of the cable is connected to an antenna terminal of a mobile telephone. According to this constitution, it is possible to resonate two different frequencies. Also, a switching member is not required. Moreover, since the ground pattern 4 is shared, this glass antenna can be provided in a space being in common with a monopole antenna as a whole.



LEGAL STATUS

[Date of request for examination]	01.02.2000
[Date of sending the examiner's decision of rejection]	18.12.2002
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The frequency change-over type glass antenna characterized by having combined the ends of the pattern for the 1st radiation and the pattern for the 2nd radiation with which die length differs, having arranged in the shape of V character to the vertical direction of a glass side, and arranging the pattern for touch-down under this V character-like pattern.
[Claim 2] The frequency change-over type glass antenna according to claim 1 characterized by arranging said pattern for the 1st and 2nd radiation in the shape of U character to the vertical direction of a glass side.
[Claim 3] The die length of said pattern for the 1st radiation is made into abbreviation (1/4) lambda 1 to the 1st wavelength lambda 1. The die length of said pattern for the 2nd radiation is made into abbreviation (1/5) lambda 2 - abbreviation (1/4) lambda 2 to the 2nd wavelength lambda 2. The frequency change-over type glass antenna according to claim 1 or 2 characterized by having made vertical lay length of said pattern for touch-down into abbreviation (1/4) lambda 1 - abbreviation (1/4) lambda 2, and making the die length of the longitudinal direction of said pattern for touch-down into abbreviation (1/4) lambda 2 - abbreviation (3/4) lambda 1.
[Claim 4] The frequency change-over type glass antenna according to claim 1 or 2 characterized by making said pattern for radiation, or said pattern for touch-down into the configuration of extraction.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to amelioration of the glass antenna mainly arranged by the windowpane of a car.
[0002]
[Description of the Prior Art] The pattern Fig. of the windowpane antenna (application-for-utility-model-registration Taira No. 38628 [four to]) for which these people applied as an example of the conventional windowpane antenna is shown in drawing 12 . This windowpane antenna 80 arranges the pattern 81 for radiation in the vertical direction of a glass side, and arranges the pattern 82 for touch-down which carried out the configuration of extraction caudad. And the core wire of the coaxial cable for electric supply was connected to lower limit section 81a of the pattern 81 for radiation, the braided wire of the coaxial cable for electric supply was connected to upper limit center-section 82a of the pattern 82 for touch-down, and the other end of this cable was connected to the antenna terminal of land mobile radiotelephone equipment or radio.
[0003] Thus, since the antenna was formed in the glass side, a height like a whip antenna was able to be lost and the air resistance at the time of car transit was able to be reduced. Moreover, it was suitable also in respect of the improvement in an appearance.
[0004]
[Problem(s) to be Solved by the Invention] However, this windowpane antenna 80 must already carry out lot preparation of the antenna, in order to use on a frequency which is different since it was the so-called monopole antenna (antenna for single frequency). However, the double tooth space was required to arrange 2 sets of monopole antennas in the windowpane of one sheet, and separately, also when change-over members (for example, a short circuit member or a change-over switch etc.) were required, it was in the change of an antenna. Then, the purpose of this invention is to offer the frequency change-over type glass antenna which can arrange in about the same tooth space as a monopole antenna, and does not need a change-over member.
[0005]
[Means for Solving the Problem] In order to solve said technical problem, this invention combined the ends of the pattern for the 1st radiation and the pattern for the 2nd radiation with which die length differs, was arranged in the shape of V character to the vertical direction of a glass side, and arranged the pattern for touch-down under this V character-like pattern.
[0006] Said pattern for the 1st and 2nd radiation may be arranged in the shape of U character to the vertical direction of a glass side.
[0007] The die length of said pattern for the 1st radiation is made into abbreviation (1/4) lambda 1 to the 1st wavelength lambda 1. The die length of said pattern for the 2nd radiation is made into abbreviation (1/5) lambda 2 - abbreviation (1/4) lambda 2 to the 2nd wavelength lambda 2. Vertical lay length of said pattern for touch-down is made into abbreviation (1/4) lambda 1 - abbreviation

(1/4) lambda 2, and it is good also considering the die length of the longitudinal direction of said pattern for touch-down as abbreviation (1/4) lambda 2 - an abbreviation (3/4) lambda 1.
[0008] It is good also considering said pattern for radiation, or said pattern for touch-down as a configuration of extraction.
[0009]
[Function] Since the ends of two patterns for radiation with which die length differs were combined, two different frequencies can be resonated. Moreover, it is necessary to form neither a short circuit member nor a change-over switch in a frequency change-over. On the other hand, since the pattern for touch-down was made common use, if the point of having added one pattern for radiation lining up side-by-side is removed, it will hardly change a configuration with a monopole antenna. Therefore, magnitude can also be carried out just like a monopole antenna, and can be arranged in a comparatively narrow tooth space.
[0010] If the pattern for both radiation is arranged in the shape of U character, the flare to right and left will decrease and space-saving will become possible.
[0011] The frequency characteristics near a monopole antenna can be acquired by setting up the magnitude of the pattern for radiation, and the pattern for touch-down according to certain conditions.
[0012] Improvement in a field of view can be aimed at by making the pattern for radiation, or the pattern for touch-down into the configuration of extraction.
[0013]
[Example] Hereafter, it explains, referring to an accompanying drawing about the example of this invention. In addition, although the antenna for a 800MHz band and 1.5GHz bands is explained, it is not limited to these frequencies.
[0014] Drawing 1 is the antenna pattern Fig. of the 1st example of the frequency change-over type glass antenna concerning this invention. The 1st example is equivalent to invention of claim 1. It comes to arrange the pattern 4 for touch-down long in all directions in the lower part of this V character-like pattern while the frequency change-over type glass antenna 1 is longwise, and it combines the pattern 2 for the 1st radiation and the pattern 3 for the 2nd radiation with which die length differs in each of lower limit sections 2a and 3a and arranging it in the shape of V character to the vertical direction of posterior part windowpane W, such as a car. In addition, although mentioned later, E by the side of the feeding point and the pattern for touch-down of F by the side of the pattern for radiation is a grounding point.
[0015] Moreover, said pattern 2 for the 1st radiation set said pattern 3 for the 2nd radiation as the include angle of 30 degrees counterclockwise to said vertical directional axis D at the include angle of 30 degrees to the vertical directional axis D of glass clockwise. In addition, it cannot be overemphasized that an include angle is not limited to 30 degrees, but it can be set as arbitration. Moreover, a pattern 2 and 3 each may be set as a different include angle.
[0016] Drawing 2 is the block diagram of the electric supply section of said glass antenna 1. Core wire 6a of the coaxial cable 6 for electric supply is connected to the bond part F of lower limit section 2a of said pattern for the 1st radiation, and lower limit section 3a of said pattern for the 2nd radiation, braided-wire 6b for touch-down of said cable 6 is connected to the upper limit center section E of said pattern 4 for touch-down (4a, 4a), and the other end of said cable 6 is connected to the antenna terminal of non-illustrated land mobile radiotelephone equipment or radio.
[0017] Thus, two different frequencies can be resonated from having prepared the feeding point in the bond part F of said radial patterns 2 and 3. Moreover, it is necessary to form neither a short circuit member nor a change-over switch in a frequency change-over. On the other hand, since said pattern 4 for touch-down was made common use, if the point of having added one of said patterns 2 and 3 for radiation lining up side-by-side is removed, it will hardly change a configuration with a monopole antenna. Therefore, magnitude can also be carried out just like a monopole antenna, and can be arranged in a comparatively narrow tooth space.

[0018] Drawing 3 is the antenna pattern Fig. of the 2nd example of the frequency change-over type glass antenna concerning this invention. The 2nd example is equivalent to invention of claim 2. It comes to arrange the pattern 14 long in all directions for touch-down in the lower part of this U character-like pattern while the frequency change-over type glass antenna 11 is longwise, arranges in abbreviation parallel the pattern 12 for the 1st radiation and the pattern 13 for the 2nd radiation with which die length differs at intervals of about 3mm, it makes it extend in the direction which faces, combines the lower-limit sections 12a and 13a of said patterns 12 and 13 and arranges them in the shape of U character.
[0019] namely, the 2nd example -- the include angle of said patterns 2 and 3 for the 1st and 2nd radiation of the 1st example -- 30 degrees to 0 times -- changing -- the dimension of a pattern -- abbreviation -- it is the same. Moreover, the same is said of the point of having prepared the feeding point in the bond part F of the lower limit sections 12a and 13a of said patterns 12 and 13 for radiation, and having established the grounding point in the upper limit center section E of said ** value pattern 14.
[0020] On the other hand, the dimension of each pattern is decided with the relation shown below. The relation of the dimension of this pattern is equivalent to invention of claim 3. That is, if wavelength to resonance frequency f (Hz) is set to lambda (m), wavelength will be called for by the degree type.
[0021]
[Equation 1] lambda=(c/f) -k [0022] However, it is the fractional shortening (0.6) of a glass antenna [in / c, and / in k / this example]. [the velocity of light (3.108m/s.)]
[0023] According to this several 1, the wavelength lambda 1 to 1.5GHz is set to 0.12m. By the way, the die length of said patterns 2 and 12 for the 1st radiation is set as abbreviation (1/4) lambda 1 to this lambda 1. Therefore, both the die length of said patterns 2 and 12 for the 1st radiation is set to 30mm.
[0024] The wavelength lambda 2 to 800MHz is similarly set to 0.225m from several 1. By the way, the die length of said patterns 3 and 13 for the 2nd radiation is set as abbreviation (1/4) lambda 2 to these lambda 2. Therefore, although both the die length of said patterns 3 and 13 for the 2nd radiation was set to 0.05625m, it was set to 0.06m, i.e., 60mm, for convenience by this example.
[0025] Moreover, the width of face of said patterns 2 and 12 for the 1st radiation and the patterns 3 and 13 for the 2nd radiation set spacing of 5mm, these patterns 2, 3, 12, and 13 for radiation, and said patterns 4 and 14 for touch-down as 2mm.
[0026] On the other hand, to wavelength lambda1 and lambda2, the vertical lay length of said patterns 4 and 14 for touch-down is set as abbreviation (1/4) lambda 1 - abbreviation (1/4) lambda 2, and the die length of the longitudinal direction of said patterns 4 and 14 for touch-down is set as abbreviation (1/4) lambda 2 - abbreviation (3/4) lambda 1. That is, vertical lay length sets up so that it may go into about 30mm thru/or about 56mm, and the range whose die length of a longitudinal direction is about 56mm thru/or about 90mm. In this example, the die length of 35mm and a longitudinal direction was set as 60mm for vertical lay length.
[0027] A frequency-characteristics graph [as opposed to the 800MHz band of the 1st and 2nd examples in drawing 4], a frequency-characteristics graph [as opposed to the 1.5GHz band of the 1st and 2nd examples in drawing 5], drawing 6 , and drawing 7 are the measurement data (for reference) of the frequency characteristics of the 1st and 2nd examples.
[0028] Among drawing, 800M criterion is the case where it is the monopole antenna whose resonance frequency is 800MHz among the windowpane antennas of said conventional example, and 1.5G criterion is the case where it is the monopole antenna whose resonance frequency is 1.5GHz among the windowpane antennas of said conventional example. Moreover, common use (deg=0) is the case where the include angle of two patterns for radiation is 0 times, i.e., the 2nd example, common use (deg=15) is the case where the include angle to the vertical directional axis D of two patterns for radiation is 15 degrees, and common use (deg=30) is the case where the include angle

to the vertical directional axis D of two patterns for radiation is 30 degrees, i.e., the 1st example.
[0029] According to drawing 4 , it is common use (deg=0) that the gain nearest to 800M criterion is acquired, and, subsequently, it is the order of common use (deg=15) and common use (deg=30). Moreover, the common use (deg=30) of the gain of common use (deg=15) and common use (deg=30) above center frequency (880MHz) is a little lower with the down side which spreads abbreviation etc. However, compared with 800M criterion, the fall of gain is 2dB of abbreviation, and, also in the case of common use (deg=30), can be called practically sufficient property.
[0030] According to drawing 5 , it is common use (deg=0) that the gain nearest to 1.5G criterion is acquired, and, subsequently, it is the order of common use (deg=30) and common use (deg=15). However, compared with 1.5G criterion, the falls of gain are 1 thru/or 2dB, and, also in the case of common use (deg=15), can be called practically sufficient property.
[0031] Thus, common use (deg=0) shows the property nearest to a standard antenna on any frequency. Moreover, it is difficult to be in the inclination for 15 degrees of gain to be a little higher with a 800MHz band in 15 include angles and 30 comparisons, and for gain to become [the direction of 30 degrees] high a little conversely with a 1.5GHz band, and to define the relation between an include angle and gain quantitatively.
[0032] In addition, although the include angle of the pattern for radiation could be arbitrary, the comparatively good result was able to be obtained in the range which is 0 times thru/or 30 degrees.
[0033] According to the above measurement result, when the include angle which the pattern for both radiation makes was changed, it turned out that gain changes. Therefore, if the relation between gain and the include angle of the pattern for radiation is investigated beforehand, it will become possible to arrange the pattern for radiation at the optimal include angle.
[0034] On the other hand, the frequency characteristics near a monopole antenna can be acquired by setting up the dimension of the pattern for radiation, and the pattern for touch-down according to certain conditions.
[0035] Drawing 8 is the antenna pattern Fig. of the 3rd example. This 3rd example is made to transform the 1st example. The frequency change-over type glass antenna 21 consists of the large pattern 24 for touch-down of width of face with which it was arranged under two patterns 22 and 23 for radiation arranged in the vertical direction by V typeface, and these patterns 22 and 23, and lower side 24a was formed in the shape of radii comparatively. Side 24a of this bottom is made to meet the bottom edge Wa of posterior part windowpane W, and if said pattern 22 thru/or 24 is arranged in the corner of windowpane W as a whole, a field of view can be raised.
[0036] Drawing 9 is the antenna pattern Fig. of the 4th example. This 4th example is equivalent to what made the pattern for radiation the configuration of extraction among invention of claim 4. The frequency change-over type glass antenna 31 consists of two patterns 32 and 33 for radiation arranged in the vertical direction in the shape of V character, and the pattern 34 for touch-down arranged under these patterns 32 and 33. Furthermore, since abbreviation parallel were made to arrange three thin electric conduction wire rods and said radial patterns 32 and 33 formed them, they become extraction-like. Therefore, said radial patterns 32 and 33 stop being able to be conspicuous easily, and improvement in a field of view can be aimed at.
[0037] Drawing 10 is the antenna pattern Fig. of the 5th example. The 5th example is equivalent to what made the pattern for touch-down the configuration of extraction among invention of claim 4. The frequency change-over type glass antenna 41 consists of two patterns 42 and 43 for radiation arranged in the vertical direction by V typeface, and the pattern 44 for touch-down arranged under these patterns 42 and 43. Since this pattern 44 for touch-down is formed in the shape of extraction, it stops being able to be conspicuous easily, therefore it can aim at improvement in a field of view.
[0038] Drawing 11 is the antenna pattern Fig. of the 6th example. The 6th example is equivalent to what made both pattern for radiation, and pattern for touch-down the shape of extraction among invention of claim 4. The frequency change-over type glass antenna 51 consists of two patterns 52 and 53 for radiation arranged in the vertical direction in the shape of V character, and the pattern

54 for touch-down of the shape of extraction arranged under these patterns 52 and 53. Furthermore, since abbreviation parallel were made to arrange each pattern and it formed three thin electric conduction wire rods, each pattern itself becomes extraction-like. Therefore, the patterns 52 and 53 for radiation and the pattern 54 for touch-down stop being able to be conspicuous easily, and improvement in a field of view can be aimed at more than in the 4th or the 5th example.

[0039] In addition, it cannot be overemphasized that the number of the lead-wire wire rods in the 5th and 6th examples is good by the number not only of three but arbitration. Moreover, the 3rd thru/or the 6th example can be similarly carried out to U character-like the pattern for radiation.

[0040]

[Effect of the Invention] Since the ends of two patterns for radiation with which die length differs were combined, two different frequencies can be resonated. Moreover, it is necessary to form neither a short circuit member nor a change-over switch in a frequency change-over. On the other hand, since the pattern for touch-down was made common use, if the point of having added one pattern for radiation lining up side-by-side is removed, it will hardly change a configuration with a monopole antenna. Therefore, magnitude can also be carried out just like a monopole antenna, and can be arranged in a comparatively narrow tooth space.

[0041] If the pattern for both radiation is arranged in the shape of U character, the flare to right and left will decrease and space-saving will become possible.

[0042] The frequency characteristics near a monopole antenna can be acquired by setting up the magnitude of the pattern for radiation, and the pattern for touch-down according to certain conditions.

[0043] Improvement in a field of view can be aimed at by making the pattern for radiation, or the pattern for touch-down into the configuration of extraction.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The antenna pattern Fig. of the 1st example of the frequency change-over type glass antenna concerning this invention
[Drawing 2] The block diagram of the electric supply section of this glass antenna
[Drawing 3] The antenna pattern Fig. of the 2nd example of this glass antenna
[Drawing 4] The frequency-characteristics graph of the 1st and 2nd examples of this glass antenna (800MHz band)
[Drawing 5] The frequency-characteristics graph of the 1st and 2nd examples of this glass antenna (1.5GHz band)
[Drawing 6] Measurement data of the frequency characteristics of the antenna of the 1st and 2nd examples of this glass antenna (800MHz)
[Drawing 7] Measurement data of the frequency characteristics of the antenna of the 1st and 2nd examples of this glass antenna (1.5GHz)
[Drawing 8] The antenna pattern Fig. of the 3rd example of this glass antenna
[Drawing 9] The antenna pattern Fig. of the 4th example of this glass antenna
[Drawing 10] The antenna pattern Fig. of the 5th example of this glass antenna
[Drawing 11] The antenna pattern Fig. of the 6th example of this glass antenna
[Drawing 12] The pattern Fig. of the conventional windowpane antenna
[Description of Notations]
1, 11, 21, 31, 41, 51 [... The pattern for the 2nd radiation 2a 3a, 12a 13a ...] The lower limit section, 4, 14, 24, 34, 44, 54 ... Pattern for touch-down... A frequency change-over type glass antenna, 2, 12, 22, 32, 42, 52 ... The pattern for the 1st radiation, 3, 13, 23, 33, 43, 53

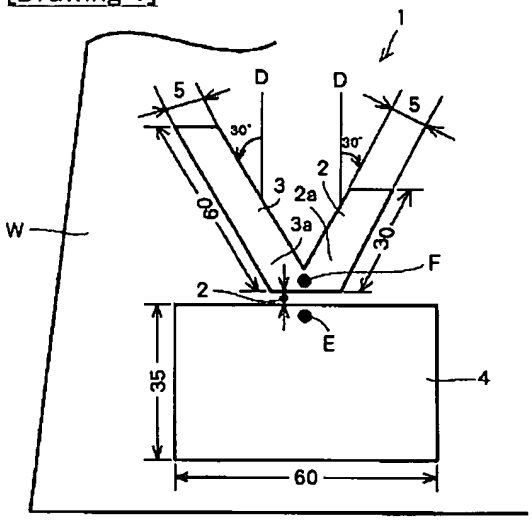
[Translation done.]

* NOTICES *

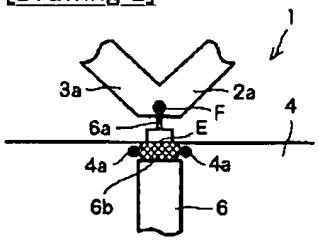
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

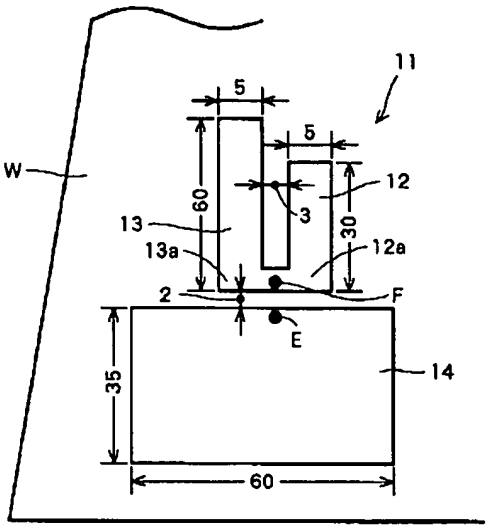
[Drawing 1]



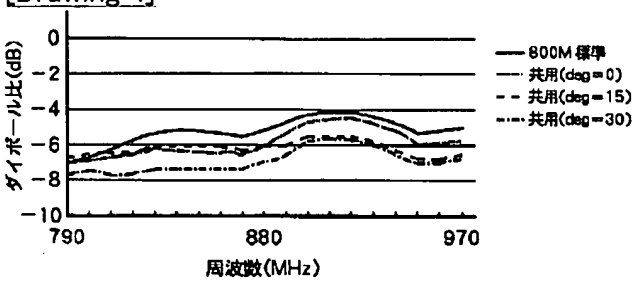
[Drawing 2]



[Drawing 3]

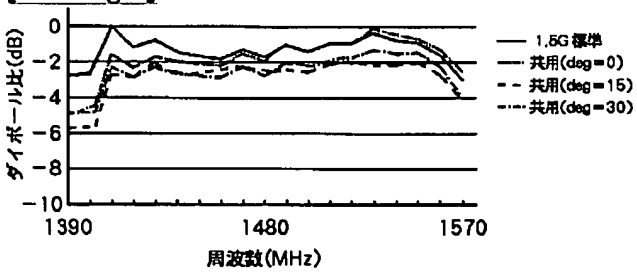


[Drawing 4]



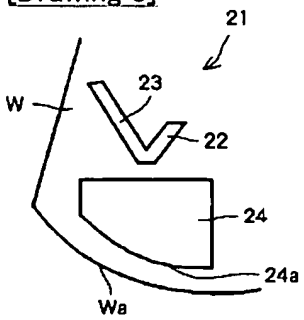
800MHz 帯

[Drawing 5]

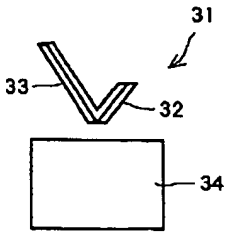


1.5GHz 帯

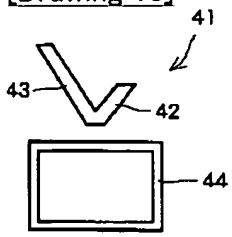
[Drawing 8]



[Drawing 9]



[Drawing 10]

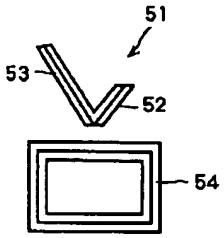


[Drawing 6]

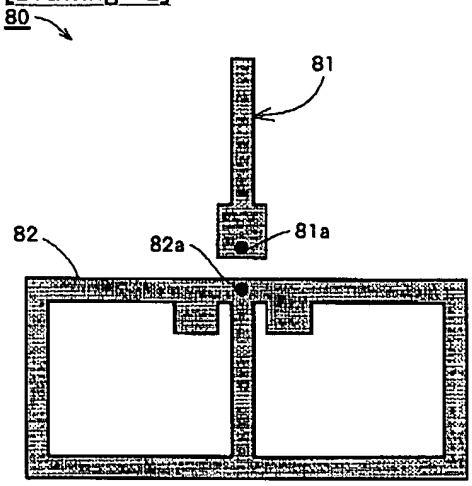
（単位 dB、ダイポール比）

周波数(MHz)	800M 標準	共用 (deg=0)	共用 (deg=15)	共用 (deg=30)
790.0	−7.0	−6.9	−6.8	−7.6
800.0	−6.4	−6.8	−6.5	−7.5
810.0	−6.1	−6.8	−6.4	−7.6
820.0	−5.7	−6.7	−6.3	−7.5
830.0	−5.3	−6.3	−5.9	−7.3
840.0	−5.2	−6.4	−5.9	−7.3
850.0	−5.2	−6.4	−5.9	−7.3
860.0	−5.4	−6.5	−6.0	−7.3
870.0	−5.6	−6.6	−6.3	−7.4
880.0	−5.1	−6.0	−6.1	−6.9
890.0	−4.7	−5.5	−5.9	−6.5
900.0	−4.3	−4.9	−5.6	−5.9
910.0	−4.1	−4.7	−5.5	−5.7
920.0	−4.1	−4.6	−5.5	−5.6
930.0	−4.4	−4.9	−5.8	−6.0
940.0	−4.8	−5.3	−6.3	−6.6
950.0	−5.3	−5.8	−6.8	−7.1
960.0	−5.3	−5.8	−6.8	−7.1
970.0	−5.1	−5.6	−6.6	−6.7
平均	−5.2	−5.9	−6.2	−6.9

[Drawing 11]



[Drawing 12]



[Drawing 7]

(単位 dB、ダイポール比)

周波数(MHz)	1.5G 標準	共用 (deg=0)	共用 (deg=15)	共用 (deg=30)
1390.0	−2.5	−4.9	−5.6	−4.9
1400.0	−2.4	−4.4	−5.4	−4.9
1410.0	−0.1	−1.7	−2.6	−2.3
1420.0	−1.0	−2.2	−2.9	−2.9
1430.0	−0.7	−1.6	−1.9	−2.3
1440.0	−1.3	−1.9	−2.7	−2.6
1450.0	−1.7	−2.1	−2.6	−2.9
1460.0	−1.8	−2.2	−2.4	−3.0
1470.0	−1.3	−1.6	−2.5	−2.4
1480.0	−1.8	−2.0	−2.6	−2.8
1490.0	−1.1	−1.1	−2.5	−2.0
1500.0	−1.4	−1.4	−2.6	−2.2
1510.0	−0.9	−0.9	−2.1	−1.8
1520.0	−0.8	−0.7	−1.9	−1.7
1530.0	−0.2	−0.1	−2.2	−1.2
1540.0	−0.5	−0.3	−2.2	−1.4
1550.0	−0.4	−0.2	−2.0	−1.3
1560.0	−1.3	−1.0	−2.7	−2.2
1570.0	−3.2	−2.6	−4.3	−4.0
平均	−1.3	−1.7	−2.8	−2.6

[Translation done.]

* NOTICES *

CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
[Section partition] The 3rd partition of the 7th section
[Publication date] April 13, Heisei 13 (2001. 4.13)

[Publication No.] JP,6-291530,A
[Date of Publication] October 18, Heisei 6 (1994. 10.18)
[Annual volume number] Open patent official report 6-2916
[Application number] Japanese Patent Application No. 5-77163
[The 7th edition of International Patent Classification]

H01Q 1/32
1/48
21/30

[FI]

H01Q 1/32 A
1/48
21/30

[Procedure revision]
[Filing Date] February 1, Heisei 12 (2000. 2.1)
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[Proposed Amendment]
[Claim(s)]
[Claim 1] The frequency change-over type glass antenna characterized by for the longitudinal direction to have combined the ends of the pattern for the 1st radiation of predetermined length, and the pattern for the 2nd radiation of predetermined length with which a longitudinal direction differs from the pattern for the 1st radiation, to have arranged the pattern for the 1st and 2nd radiation in the shape of V character to the vertical direction along a glass side, and to arrange the pattern for touch-down in the flection lower part of a V character-like pattern.
[Claim 2] The frequency change-over type glass antenna characterized by for the longitudinal direction to have combined the ends of the pattern for the 1st radiation of predetermined length, and the pattern for the 2nd radiation of predetermined length with which a longitudinal direction differs from the pattern for the 1st radiation, to have arranged the pattern for the 1st and 2nd radiation in the shape of U character to the vertical direction along a glass side, and to arrange the

pattern for touch-down in the flection lower part of a U character-like pattern.
[Claim 3] The die length of said pattern for the 1st radiation is made into abbreviation (1/4) lambda 1 to the 1st wavelength lambda 1. The die length of said pattern for the 2nd radiation is made into abbreviation (1/5) lambda 2 - abbreviation (1/4) lambda 2 to the 2nd wavelength lambda 2. The frequency change-over type glass antenna according to claim 1 or 2 characterized by having made vertical lay length of said pattern for touch-down into abbreviation (1/4) lambda 1 - abbreviation (1/4) lambda 2, and making the die length of the longitudinal direction of said pattern for touch-down into abbreviation (1/4) lambda 2 - abbreviation (3/4) lambda 1.
[Claim 4] The frequency change-over type glass antenna according to claim 1 or 2 characterized by making said pattern for radiation, or said pattern for touch-down into the configuration of extraction.

[Procedure amendment 2]
[Document to be Amended] Specification
[Item(s) to be Amended] 0005
[Method of Amendment] Modification
[Proposed Amendment]
[0005]
[Means for Solving the Problem] The frequency change-over type glass antenna applied to claim 1 of this invention in order to solve said technical problem A longitudinal direction combines the ends of the pattern for the 1st radiation of predetermined length, and the pattern for the 2nd radiation of predetermined length with which a longitudinal direction differs from the pattern for the 1st radiation. The pattern for the 1st and 2nd radiation is arranged in the shape of V character to the vertical direction along a glass side, and the pattern for touch-down is arranged in the flection lower part of a V character-like pattern.
[Procedure amendment 3]
[Document to be Amended] Specification
[Item(s) to be Amended] 0006
[Method of Amendment] Modification
[Proposed Amendment]
[0006] A longitudinal direction combines the ends of the pattern for the 1st radiation of predetermined length, and the pattern for the 2nd radiation of predetermined length with which a longitudinal direction differs from the pattern for the 1st radiation, and arranges the pattern for the 1st and 2nd radiation in the shape of U character to the vertical direction along a glass side, and the frequency change-over type glass antenna concerning claim 2 of this invention arranges the pattern for touch-down in the flection lower part of a U character-like pattern.
[Procedure amendment 4]
[Document to be Amended] Specification
[Item(s) to be Amended] 0009
[Method of Amendment] Modification
[Proposed Amendment]
[0009]
[Function] Since the ends of two patterns for radiation with which die length differs were combined according to the frequency change-over type glass antenna concerning claim 1, two different frequencies can be resonated. Moreover, it is necessary to form neither a short circuit member nor a change-over switch in a frequency change-over. On the other hand, since the pattern for touch-down was made common use, if the point of having added one pattern for radiation lining up side-by-side is removed, it will hardly change a configuration with a monopole antenna. Therefore, magnitude can also be carried out just like a monopole antenna, and can be arranged in a comparatively narrow tooth space.
[Procedure amendment 5]

[Document to be Amended] Specification
[Item(s) to be Amended] 0010
[Method of Amendment] Modification
[Proposed Amendment]
[0010] Since according to the frequency change-over type glass antenna concerning claim 2 the 1st and 2nd radiation patterns are paralleled and it can arrange, the flare to a longitudinal direction decreases and space-saving becomes possible.
[Procedure amendment 6]
[Document to be Amended] Specification
[Item(s) to be Amended] 0019
[Method of Amendment] Modification
[Proposed Amendment]
[0019] namely, the 2nd example -- the include angle of said patterns 2 and 3 for the 1st and 2nd radiation of the 1st example -- 30 degrees to 0 times -- changing -- the dimension of a pattern -- abbreviation -- it is the same. Moreover, the same is said of the point of having prepared the feeding point in the bond part F of the lower limit sections 12a and 13a of said patterns 12 and 13 for radiation, and having established the grounding point in the upper limit center section E of said touch-down pattern 14.
[Procedure amendment 7]
[Document to be Amended] Specification
[Item(s) to be Amended] 0041
[Method of Amendment] Modification
[Proposed Amendment]
[0041] If the pattern for both radiation is arranged in the shape of U character, since the 1st and 2nd radiation patterns are paralleled and it can arrange, the flare to right and left decreases and space-saving becomes possible. Moreover, the gain nearest to [in a large UHF band] a standard antenna is acquired.

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平6－291530

(43)公開日　平成６年(1994)10月18日

(51)Int.Cl.[5]		識別記号	庁内整理番号	Ｆ Ｉ	技術表示箇所
Ｈ０１Ｑ	1/32	Ａ	7037－5Ｊ		
	1/48		7037－5Ｊ		
	21/30		2109－5Ｊ		

審査請求　未請求　請求項の数４　ＯＬ　（全 ７ 頁）

(21)出願番号　特願平5－77163

(22)出願日　平成５年(1993)４月２日

(71)出願人　000004008
日本板硝子株式会社
大阪府大阪市中央区道修町３丁目５番11号

(72)発明者　村上　治憲
大阪府大阪市中央区道修町３丁目５番11号
日本板硝子株式会社内

(72)発明者　飯島　浩
大阪府大阪市中央区道修町３丁目５番11号
日本板硝子株式会社内

(72)発明者　土居　亮吉
大阪府大阪市中央区道修町３丁目５番11号
日本板硝子株式会社内

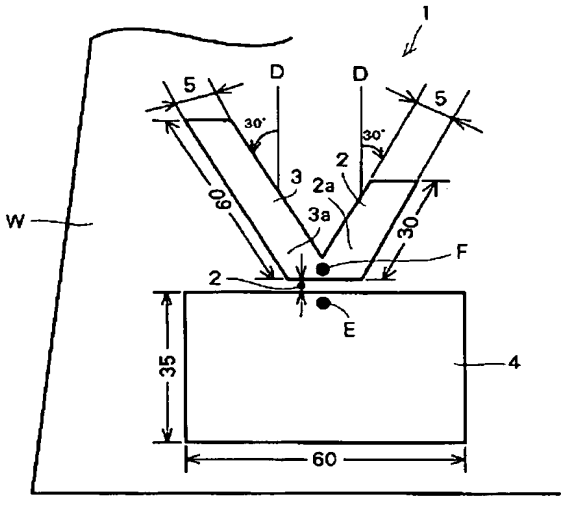
(74)代理人　弁理士　下田　容一郎　（外２名）

(54)【発明の名称】　周波数切換式ガラスアンテナ

(57)【要約】

【目的】　モノポールアンテナ並みのスペースに配設でき、且つ切換部材を必要としない周波数切換式ガラスアンテナを提供すること。

【構成】　長さの異なる第１放射用パターン２と第２放射用パターン３との一端同士を結合させガラス面Ｗの上下方向に対しＶ字状に配設し、このＶ字状パターンの下方に接地用パターン４を配設してガラスアンテナ１を形成した。又、Ｖ字状パターン下端部Ｆに給電用同軸ケーブルの芯線を接続し、接地用パターン４の上端中央部Ｅに前記ケーブルの編組線を接続し、前記ケーブルの他端を自動車電話のアンテナ端子に接続した。この構成によれば異なる２つの周波数に共振させることができる。しかも切換部材を必要としない。又、接地用パターン４を共用にしたため全体としてモノポールアンテナ並みのスペースに配設できる。



1

【特許請求の範囲】
【請求項１】　長さの異なる第１放射用パターンと第２放射用パターンとの一端同士を結合させガラス面の上下方向に対しＶ字状に配設し、このＶ字状パターンの下方に接地用パターンを配設したことを特徴とする周波数切換式ガラスアンテナ。
【請求項２】　前記第１及び第２放射用パターンをガラス面の上下方向に対しＵ字状に配設したことを特徴とする請求項１記載の周波数切換式ガラスアンテナ。
【請求項３】　前記第１放射用パターンの長さを第１の波長λ１に対し約（１／４）λ１とし、前記第２放射用パターンの長さを第２の波長λ２に対し約（１／５）λ２～約（１／４）λ２とし、前記接地用パターンの上下方向の長さを約（１／４）λ１～約（１／４）λ２とし、前記接地用パターンの左右方向の長さを約（１／４）λ２～約（３／４）λ１としたことを特徴とする請求項１又は２記載の周波数切換式ガラスアンテナ。
【請求項４】　前記放射用パターン又は前記接地用パターンを中抜きの形状としたことを特徴とする請求項１又は２記載の周波数切換式ガラスアンテナ。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は、主に車両の窓ガラスに配設されるガラスアンテナの改良に関する。
【０００２】
【従来の技術】従来の窓ガラスアンテナの一例として本出願人が出願した窓ガラスアンテナ（実願平４－３８６２８号）のパターン図を図１２に示す。この窓ガラスアンテナ８０は、ガラス面の上下方向に放射用パターン８１を配設し、下方に中抜きの形状をした接地用パターン８２を配設したものである。そして、放射用パターン８１の下端部８１ａに給電用同軸ケーブルの芯線を接続し、接地用パターン８２の上端中央部８２ａに給電用同軸ケーブルの編組線を接続し、このケーブルの他端を自動車電話装置やラジオのアンテナ端子に接続していた。
【０００３】このようにアンテナをガラス面に形成したので、ホイップアンテナのような突起部がなくなり、車両走行時の空気抵抗を低減させることができた。又、外観向上の面でも好適であった。
【０００４】
【発明が解決しようとする課題】ところがこの窓ガラスアンテナ８０は所謂モノポールアンテナ（単一周波数用アンテナ）であったため、異なる周波数で用いるためにはアンテナをもう一組用意しなければならなかった。しかし、１枚の窓ガラスに二組のモノポールアンテナを配設するには倍のスペースが必要であり、又、アンテナの切換えに別途切換部材（例えば、短絡部材または切換スイッチ等）が必要な場合もあった。そこで本発明の目的は、モノポールアンテナ並みのスペースに配設でき、且つ切換部材を必要としない周波数切換式ガラスアンテナ

2

を提供することにある。
【０００５】
【課題を解決するための手段】前記課題を解決するために本発明は、長さの異なる第１放射用パターンと第２放射用パターンとの一端同士を結合させガラス面の上下方向に対しＶ字状に配設し、このＶ字状パターンの下方に接地用パターンを配設した。
【０００６】前記第１及び第２放射用パターンをガラス面の上下方向に対しＵ字状に配設してもよい。
【０００７】前記第１放射用パターンの長さを第１の波長λ１に対し約（１／４）λ１とし、前記第２放射用パターンの長さを第２の波長λ２に対し約（１／５）λ２～約（１／４）λ２とし、前記接地用パターンの上下方向の長さを約（１／４）λ１～約（１／４）λ２とし、前記接地用パターンの左右方向の長さを約（１／４）λ２～約（３／４）λ１としてもよい。
【０００８】前記放射用パターン又は前記接地用パターンを中抜きの形状としてもよい。
【０００９】
【作用】長さの異なる２つの放射用パターンの一端同士を結合させたので、異なる２つの周波数に共振させることができる。又、周波数切換用に短絡部材や切換スイッチ等を設ける必要がない。一方、接地用パターンは共用にしたので放射用パターンを横並びに１本追加した点を除くとモノポールアンテナと殆ど構成が変わらない。従って、大きさもモノポールアンテナ並みにすることができ比較的狭いスペースに配設できる。
【００１０】両放射用パターンをＵ字状に配設すると左右への拡がりが少なくなり省スペースが可能となる。
【００１１】放射用パターン及び接地用パターンの大きさを一定の条件に従って設定することによりモノポールアンテナに近い周波数特性を得ることができる。
【００１２】放射用パターン又は接地用パターンを中抜きの形状にすることにより視界の向上を図ることができる。
【００１３】
【実施例】以下、本発明の実施例について添付図面を参照しながら説明する。尚、８００ＭＨｚ帯及び１．５ＧＨｚ帯用アンテナについて説明するがこれらの周波数に限定されるものではない。
【００１４】図１は本発明に係る周波数切換式ガラスアンテナの第１実施例のアンテナパターン図である。第１実施例は請求項１の発明に相当する。周波数切換式ガラスアンテナ１は、縦長で長さが異なる第１放射用パターン２と第２放射用パターン３とを夫々の下端部２ａ，３ａで結合させ、車両等の後部窓ガラスＷの上下方向に対しＶ字状に配設するとともに、このＶ字状パターンの下方に縦横に長い接地用パターン４を配設してなる。尚、後述するが放射用パターン側のＦは給電点、接地用パターン側のＥは接地点である。

【００１５】又、前記第１放射用パターン２はガラスの上下方向軸Ｄに対し時計方向に３０度の角度に、前記第２放射用パターン３は前記上下方向軸Ｄに対し反時計方向に３０度の角度に設定した。尚、角度は３０度に限定されず任意に設定できることはいうまでもない。又、パターン２，３夫々を異なる角度に設定してもよい。

【００１６】図２は前記ガラスアンテナ１の給電部の構成図である。前記第１放射用パターンの下端部２ａと前記第２放射用パターンの下端部３ａの結合部Ｆには給電用同軸ケーブル６の芯線６ａが接続され、前記接地用パターン４の上端中央部Ｅ（４ａ，４ａ）には前記ケーブル６の接地用編組線６ｂが接続され、前記ケーブル６の他端は不図示の自動車電話装置やラジオのアンテナ端子に接続される。

【００１７】このように前記放射状パターン２，３の結合部Ｆに給電点を設けたことから、異なる２つの周波数に共振させることができる。又、周波数切換用に短絡部材や切換スイッチ等を設ける必要がない。一方、前記接地用パターン４は共用にしたので前記放射用パターン２，３を横並びに１本追加した点を除くとモノポールアンテナと殆ど構成が変わらない。従って、大きさもモノポールアンテナ並みにすることができ比較的狭いスペースに配設できる。

【００１８】図３は本発明に係る周波数切換式ガラスアンテナの第２実施例のアンテナパターン図である。第２実施例は請求項２の発明に相当する。周波数切換式ガラスアンテナ１１は、縦長で長さが異なる第１放射用パターン１２と第２放射用パターン１３とを約３ｍｍの間隔で略平行に配設し、前記パターン１２，１３の下端部１２ａ，１３ａを相対する方向に延出させて結合しＵ字状に配設するとともに、このＵ字状パターンの下方に縦横に長い接地用パターン１４を配置してなる。

【００１９】即ち、第２実施例は第１実施例の前記第１及び第２放射用パターン２，３の角度を３０度から０度に変更したものであり、パターンの寸法は略同じである。又、前記放射用パターン１２，１３の下端部１２ａ，１３ａの結合部Ｆに給電点を設け、前記接値パターン１４の上端中央部Ｅに接地点を設けた点も同様である。

【００２０】一方、各パターンの寸法は次に示す関係により決められる。このパターンの寸法の関係が請求項３の発明に相当する。即ち、共振周波数ｆ（Ｈｚ）に対する波長をλ（ｍ）とすると、波長は次式により求められる。

【００２１】

【数１】λ＝（ｃ／ｆ）・ｋ

【００２２】但し、ｃは光速（３・１０⁸ｍ／ｓ．）、ｋは本実施例におけるガラスアンテナの短縮率（０．６）である。

【００２３】この数１によれば、１．５ＧＨｚに対する波長λ１は０．１２ｍとなる。ところで前記第１放射用パターン２，１２の長さはこのλ１に対し約（１／４）λ１に設定する。従って、前記第１放射用パターン２，１２の長さは共に３０ｍｍとなる。

【００２４】同様にして数１より８００ＭＨｚに対する波長λ２は０．２２５ｍとなる。ところで前記第２放射用パターン３，１３の長さはこのλ２に対し約（１／４）λ２に設定する。従って、前記第２放射用パターン３，１３の長さは共に０．０５６２５ｍとなるが本実施例では便宜上０．０６ｍ、即ち、６０ｍｍに設定した。

【００２５】又、前記第１放射用パターン２，１２及び第２放射用パターン３，１３の幅は５ｍｍ、これらの放射用パターン２，３，１２，１３と前記接地用パターン４，１４との間隔は２ｍｍに設定した。

【００２６】一方、波長λ１及びλ２に対し前記接地用パターン４，１４の上下方向の長さを約（１／４）λ１～約（１／４）λ２に、前記接地用パターン４，１４の左右方向の長さを約（１／４）λ２～約（３／４）λ１に設定する。即ち、上下方向の長さが約３０ｍｍ乃至約５６ｍｍ、左右方向の長さが約５６ｍｍ乃至約９０ｍｍの範囲に入るよう設定する。本実施例では上下方向の長さを３５ｍｍ、左右方向の長さを６０ｍｍに設定した。

【００２７】図４は第１及び第２実施例の８００ＭＨｚ帯に対する周波数特性グラフ、図５は第１及び第２実施例の１．５ＧＨｚ帯に対する周波数特性グラフ、図６、図７は第１及び第２実施例の周波数特性の測定データ（参照用）である。

【００２８】図中、８００Ｍ標準とは前記従来例の窓ガラスアンテナのうち共振周波数が８００ＭＨｚのモノポールアンテナの場合であり、１．５Ｇ標準とは前記従来例の窓ガラスアンテナのうち共振周波数が１．５ＧＨｚのモノポールアンテナの場合である。又、共用（ｄｅｇ＝０）とは２つの放射用パターンの角度が０度、即ち第２実施例の場合であり、共用（ｄｅｇ＝１５）とは２つの放射用パターンの上下方向軸Ｄに対する角度が１５度の場合であり、共用（ｄｅｇ＝３０）とは２つの放射用パターンの上下方向軸Ｄに対する角度が３０度、即ち第１実施例の場合である。

【００２９】図４によれば、８００Ｍ標準に最も近い利得が得られるのは共用（ｄｅｇ＝０）であり、次いで共用（ｄｅｇ＝１５）、共用（ｄｅｇ＝３０）の順である。又、中心周波数（８８０ＭＨｚ）より上側では共用（ｄｅｇ＝１５）と共用（ｄｅｇ＝３０）の利得は略等しく、下側では共用（ｄｅｇ＝３０）の方がやや低い。しかし、共用（ｄｅｇ＝３０）の場合でも８００Ｍ標準に比べ利得の低下は略２ｄＢであり実用上十分な特性といえる。

【００３０】図５によれば、１．５Ｇ標準に最も近い利得が得られるのは共用（ｄｅｇ＝０）であり、次いで共用（ｄｅｇ＝３０）、共用（ｄｅｇ＝１５）の順であ

る。しかし、共用（ｄｅｇ＝１５）の場合でも１．５Ｇ標準に比べ利得の低下は１乃至２ｄＢであり実用上十分な特性といえる。

【００３１】このように共用（ｄｅｇ＝０）が何れの周波数でも標準アンテナに最も近い特性を示す。又、角度１５度と３０度との比較では、８００ＭＨｚ帯では１５度の方がやや利得が高く、１．５ＧＨｚ帯では逆に３０度の方がやや利得が高くなる傾向にあり角度と利得の関係を定量的に定めるのは難しい。

【００３２】尚、放射用パターンの角度は任意でよいが０度乃至３０度の範囲において比較的良好な結果を得ることができた。

【００３３】以上の測定結果によれば、両放射用パターンのなす角度を変えると利得が変わることが分った。従って、予め利得と放射用パターンの角度との関係を調べておけば放射用パターンを最適な角度で配設することが可能となる。

【００３４】一方、放射用パターン及び接地用パターンの寸法を一定の条件に従って設定することによりモノポールアンテナに近い周波数特性を得ることができる。

【００３５】図８は第３実施例のアンテナパターン図である。この第３実施例は第１実施例を変形させたものである。周波数切換式ガラスアンテナ２１は、上下方向にＶ字形に配設された２本の放射用パターン２２，２３と、このパターン２２，２３の下方に配設され下側の辺２４ａが円弧状に形成された比較的幅の広い接地用パターン２４とから成る。この下側の辺２４ａを、例えば後部窓ガラスＷの下側縁部Ｗａに沿わせ、前記パターン２２乃至２４を全体として窓ガラスＷの隅に配設すれば視界を向上させることができる。

【００３６】図９は第４実施例のアンテナパターン図である。この第４実施例は請求項４の発明のうち放射用パターンを中抜きの形状にしたものに相当する。周波数切換式ガラスアンテナ３１は、上下方向にＶ字状に配設された２本の放射用パターン３２，３３と、このパターン３２，３３の下方に配設された接地用パターン３４とから成る。更に、前記放射状パターン３２，３３は３本の細い導電線材を略平行に配列させて形成したため中抜き状となる。従って、前記放射状パターン３２，３３が目立ち難くなり視界の向上を図ることができる。

【００３７】図１０は第５実施例のアンテナパターン図である。第５実施例は請求項４の発明のうち接地用パターンを中抜きの形状にしたものに相当する。周波数切換式ガラスアンテナ４１は、上下方向にＶ字形に配設された２本の放射用パターン４２，４３と、このパターン４２，４３の下方に配設された接地用パターン４４から成る。この接地用パターン４４は中抜き状に形成されているため目立ち難くなり、従って視界の向上を図ることができる。

【００３８】図１１は第６実施例のアンテナパターン図

である。第６実施例は請求項４の発明のうち放射用パターン及び接地用パターンの両者を中抜き状にしたものに相当する。周波数切換式ガラスアンテナ５１は、上下方向にＶ字状に配設された２本の放射用パターン５２，５３と、このパターン５２，５３の下方に配設された中抜き状の接地用パターン５４とから成る。更に、各パターンは３本の細い導電線材を略平行に配列させて形成したため各パターン自体も中抜き状となる。従って、放射用パターン５２，５３及び接地用パターン５４ともに目立ち難くなり第４又は第５実施例以上に視界の向上を図ることができる。

【００３９】尚、第５及び第６実施例における導線線材の数は３本に限らず任意の数でよいことはいうまでもない。又、第３乃至第６実施例はＵ字状の放射用パターンに対しても同様に実施できる。

【００４０】

【発明の効果】長さの異なる２つの放射用パターンの一端同士を結合させたので、異なる２つの周波数に共振させることができる。又、周波数切換用に短絡部材や切換スイッチ等を設ける必要がない。一方、接地用パターンは共用にしたので放射用パターンを横並びに１本追加した点を除くとモノポールアンテナと殆ど構成が変わらない。従って、大きさもモノポールアンテナ並みにすることができ比較的狭いスペースに配設できる。

【００４１】両放射用パターンをＵ字状に配設すると左右への拡がりが少なくなり省スペースが可能となる。

【００４２】放射用パターン及び接地用パターンの大きさを一定の条件に従って設定することによりモノポールアンテナに近い周波数特性を得ることができる。

【００４３】放射用パターン又は接地用パターンを中抜きの形状にすることにより視界の向上を図ることができる。

【図面の簡単な説明】

【図１】本発明に係る周波数切換式ガラスアンテナの第１実施例のアンテナパターン図

【図２】同ガラスアンテナの給電部の構成図

【図３】同ガラスアンテナの第２実施例のアンテナパターン図

【図４】同ガラスアンテナの第１及び第２実施例の周波数特性グラフ（８００ＭＨｚ帯）

【図５】同ガラスアンテナの第１及び第２実施例の周波数特性グラフ（１．５ＧＨｚ帯）

【図６】同ガラスアンテナの第１及び第２実施例のアンテナの周波数特性の測定データ（８００ＭＨｚ）

【図７】同ガラスアンテナの第１及び第２実施例のアンテナの周波数特性の測定データ（１．５ＧＨｚ）

【図８】同ガラスアンテナの第３実施例のアンテナパターン図

【図９】同ガラスアンテナの第４実施例のアンテナパターン図

7

【図１０】同ガラスアンテナの第５実施例のアンテナパターン図

【図１１】同ガラスアンテナの第６実施例のアンテナパターン図

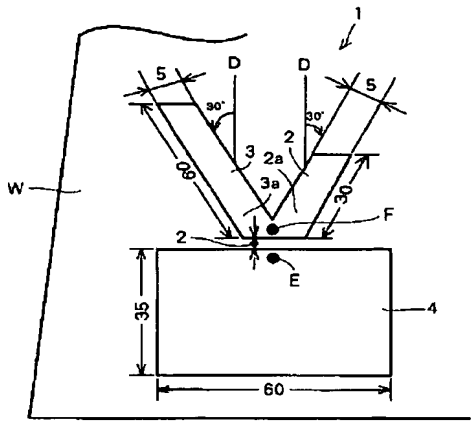
【図１２】従来の窓ガラスアンテナのパターン図

【符号の説明】

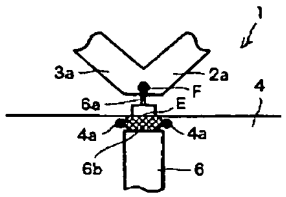
8

＊１，１１，２１，３１，４１，５１･･･周波数切換式ガラスアンテナ、２，１２，２２，３２，４２，５２･･･第１放射用パターン、３，１３，２３，３３，４３，５３･･･第２放射用パターン、２ａ，３ａ，１２ａ，１３ａ･･･ 下端部、４，１４，２４，３４，４４，５４･･･＊　接地用パターン。

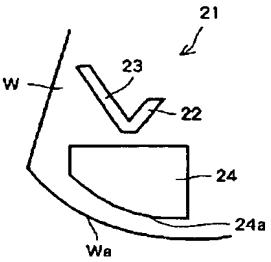
【図１】



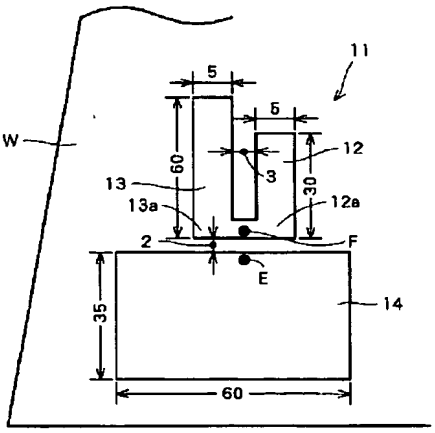
【図２】



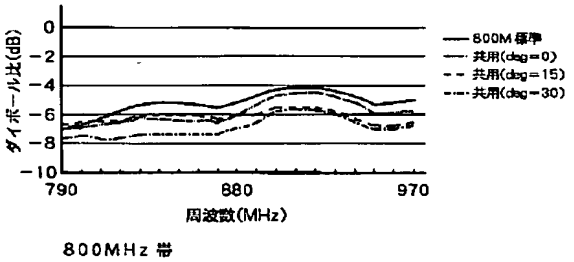
【図８】



【図３】

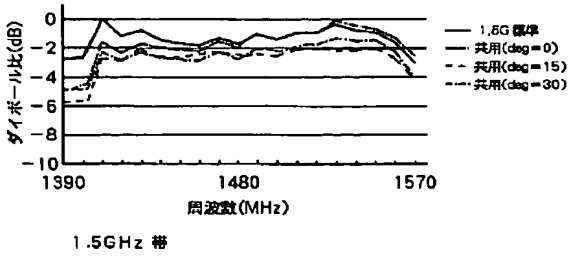


【図４】



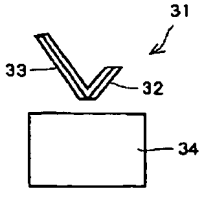
800MHz 帯

【図５】

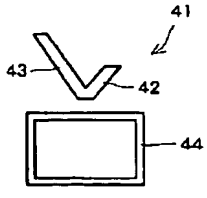


1.5GHz 帯

【図９】



【図１０】

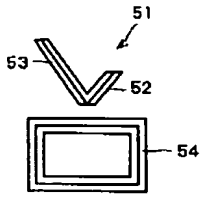


【図６】

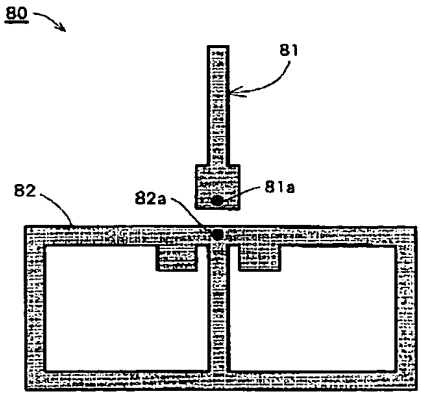
（単位 dB、ダイポール比）

周波数(MHz)	800M 標準	共用 (deg=0)	共用 (deg=15)	共用 (deg=30)
790.0	−7.0	−6.9	−6.8	−7.6
800.0	−6.4	−6.8	−6.5	−7.5
810.0	−6.1	−6.8	−6.4	−7.6
820.0	−5.7	−6.7	−6.3	−7.5
830.0	−5.3	−6.3	−5.9	−7.3
840.0	−5.2	−6.4	−5.9	−7.3
850.0	−5.2	−6.4	−5.9	−7.3
860.0	−5.4	−6.5	−6.0	−7.3
870.0	−5.6	−6.6	−6.3	−7.4
880.0	−5.1	−6.0	−6.1	−6.9
890.0	−4.7	−5.5	−5.9	−6.5
900.0	−4.3	−4.9	−5.6	−5.9
910.0	−4.1	−4.7	−5.5	−5.7
920.0	−4.1	−4.6	−5.5	−5.6
930.0	−4.4	−4.9	−5.8	−6.0
940.0	−4.8	−5.3	−6.3	−6.6
950.0	−5.3	−5.8	−6.8	−7.1
960.0	−5.3	−5.8	−6.8	−7.1
970.0	−5.1	−5.6	−6.6	−6.7
平均	−5.2	−5.9	−6.2	−6.9

【図１１】



【図１２】



【図７】

（単位 dB、ダイポール比）

周波数(MHz)	1.5G 標準	共用 (deg=0)	共用 (deg=15)	共用 (deg=30)
1390.0	−2.5	−4.9	−5.6	−4.9
1400.0	−2.4	−4.4	−5.4	−4.9
1410.0	−0.1	−1.7	−2.6	−2.3
1420.0	−1.0	−2.2	−2.9	−2.9
1430.0	−0.7	−1.6	−1.9	−2.3
1440.0	−1.3	−1.9	−2.7	−2.6
1450.0	−1.7	−2.1	−2.6	−2.9
1460.0	−1.8	−2.2	−2.4	−3.0
1470.0	−1.3	−1.6	−2.5	−2.4
1480.0	−1.8	−2.0	−2.6	−2.8
1490.0	−1.1	−1.1	−2.5	−2.0
1500.0	−1.4	−1.4	−2.6	−2.2
1510.0	−0.9	−0.9	−2.1	−1.8
1520.0	−0.8	−0.7	−1.9	−1.7
1530.0	−0.2	−0.1	−2.2	−1.2
1540.0	−0.5	−0.3	−2.2	−1.4
1550.0	−0.4	−0.2	−2.0	−1.3
1560.0	−1.3	−1.0	−2.7	−2.2
1570.0	−3.2	−2.6	−4.3	−4.0
平均	−1.3	−1.7	−2.8	−2.6

【公報種別】特許法第１７条の２の規定による補正の掲載
【部門区分】第７部門第３区分
【発行日】平成１３年４月１３日（２００１．４．１３）

【公開番号】特開平６－２９１５３０
【公開日】平成６年１０月１８日（１９９４．１０．１８）
【年通号数】公開特許公報６－２９１６
【出願番号】特願平５－７７１６３
【国際特許分類第７版】
H01Q 1/32
1/48
21/30
【ＦＩ】
H01Q 1/32 A
1/48
21/30

【手続補正書】
【提出日】平成１２年２月１日（２０００．２．１）
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】特許請求の範囲
【補正方法】変更
【補正内容】
【特許請求の範囲】
【請求項１】　長手方向が所定長の第１放射用パターンと、長手方向が第１放射用パターンとは異なる所定長の第２放射用パターンとの一端同士を結合させ、第１および第２放射用パターンをガラス面に沿った上下方向に対しＶ字状に配設し、Ｖ字状パターンの屈曲部下方に接地用パターンを配設したことを特徴とする周波数切換式ガラスアンテナ。
【請求項２】　長手方向が所定長の第１放射用パターンと、長手方向が第１放射用パターンとは異なる所定長の第２放射用パターンとの一端同士を結合させ、第１および第２放射用パターンをガラス面に沿った上下方向に対しＵ字状に配設し、Ｕ字状パターンの屈曲部下方に接地用パターンを配設したことを特徴とする周波数切換式ガラスアンテナ。
【請求項３】　前記第１放射用パターンの長さを第１の波長λ１に対し約（１／４）λ１とし、前記第２放射用パターンの長さを第２の波長λ２に対し約（１／５）λ２～約（１／４）λ２とし、前記接地用パターンの上下方向の長さを約（１／４）λ１～約（１／４）λ２とし、前記接地用パターンの左右方向の長さを約（１／４）λ２～約（３／４）λ１としたことを特徴とする請求項１又は２記載の周波数切換式ガラスアンテナ。
【請求項４】　前記放射用パターン又は前記接地用パターンを中抜きの形状としたことを特徴とする請求項１又は２記載の周波数切換式ガラスアンテナ。

【手続補正２】
【補正対象書類名】明細書
【補正対象項目名】０００５
【補正方法】変更
【補正内容】
【０００５】
【課題を解決するための手段】前記課題を解決するため本発明の請求項１に係る周波数切換式ガラスアンテナは、長手方向が所定長の第１放射用パターンと、長手方向が第１放射用パターンとは異なる所定長の第２放射用パターンとの一端同士を結合させ、第１および第２放射用パターンをガラス面に沿った上下方向に対しＶ字状に配設し、Ｖ字状パターンの屈曲部下方に接地用パターンを配設したものである。
【手続補正３】
【補正対象書類名】明細書
【補正対象項目名】０００６
【補正方法】変更
【補正内容】
【０００６】本発明の請求項２に係る周波数切換式ガラスアンテナは、長手方向が所定長の第１放射用パターンと、長手方向が第１放射用パターンとは異なる所定長の第２放射用パターンとの一端同士を結合させ、第１および第２放射用パターンをガラス面に沿った上下方向に対しＵ字状に配設し、Ｕ字状パターンの屈曲部下方に接地用パターンを配設したものである。
【手続補正４】
【補正対象書類名】明細書
【補正対象項目名】０００９
【補正方法】変更
【補正内容】
【０００９】

【作用】請求項１に係る周波数切換式ガラスアンテナによれば、長さの異なる２つの放射用パターンの一端同士を結合させたので、異なる２つの周波数に共振させることができる。又、周波数切換用に短絡部材や切換スイッチ等を設ける必要がない。一方、接地用パターンは共用にしたので放射用パターンを横並びに１本追加した点を除くとモノポールアンテナと殆ど構成が変わらない。従って、大きさもモノポールアンテナ並みにすることができ比較的狭いスペースに配設できる。

【手続補正５】
【補正対象書類名】明細書
【補正対象項目名】００１０
【補正方法】変更
【補正内容】
【００１０】請求項２に係る周波数切換式ガラスアンテナによれば、第１および第２放射パターンどうしを平行させて配置できるため、左右方向への拡がりが少なくなり省スペースが可能となる。

【手続補正６】
【補正対象書類名】明細書
【補正対象項目名】００１９
【補正方法】変更
【補正内容】
【００１９】即ち、第２実施例は第１実施例の前記第１及び第２放射用パターン２，３の角度を３０度から０度に変更したものであり、パターンの寸法は略同じである。又、前記放射用パターン１２，１３の下端部１２ａ，１３ａの結合部Ｆに給電点を設け、前記接地パターン１４の上端中央部Ｅに接地点を設けた点も同様である。

【手続補正７】
【補正対象書類名】明細書
【補正対象項目名】００４１
【補正方法】変更
【補正内容】
【００４１】両放射用パターンをＵ字状に配設すると、第１および第２放射パターンどうしを平行させて配置できるため、左右への拡がりが少なくなり省スペースが可能となる。また、広いＵＨＦ帯域で標準アンテナに最も近い利得が得られる。